DOCUMENT RESUME

ED 315 616 CE 054 166

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TITLE Developing a Competency-Based Test Item Bank.
PUB DATE Dec 89
NOTE 7p.; Paper prepared for presentation at the American Vocational Association Convention (Orlando, FL, December 1989).
PUB TYPE Guides - Non-Classroom Use (055) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Competency Based Education; Field Tests; Item Banks; Postsecondary Education; Pretests Posttests; Secondary Education; *Task Analysis; *Test Construction; *Test Items; Test Reliability; Test Validity
IDENTIFIERS *Vocational Technical Education Consortium States

ABSTRACT

The premise of this document is that trade instructors and incumbent workers can work together as a writing team to develop test items for vocational education. The development process used by the Vocational-Technical Education Consortium of States (V-TECS) is described as follows: (1) identify and validate a task list; (2) conduct task analysis; (3) write test items; (4) review and edit test items; and (5) aid in validating items (field test). Procedures are itemized for task analysis and test item writing, and tips are provided for field testing and validity. A list of 13 references is included. (KC)

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DEVELOPING A COMPETENCY-BASED TEST ITEM BANK

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DEVELOPING A COMPETENCY-BASED TEST ITEM BANK

How can a task be measured as competently performed? What level of accuracy is considered acceptable? What objective criteria determines success? When a task is completed successfully and accurately in an instructor's eyes, is it successful or accurate in the experienced eyes of the workers for whom the task has daily meaning? These are some of the difficulties facing competency-based test item writers. One solution is to employ trade instructors and incumbent workers as members of a test item writing team. If the items are edited by test item construction experts, tasks can be measured in terms of realistic criteria while maintaining educational validity.

Arkansas is a member of V-TECS (Vocational-Technical Education Consortium of States). The development format cited here follows the V-TECS format. V-TECS test items are based on validated task lists of the occupation for which they are written. This method also reflects changes such as emerging technological tasks, task obsolescence, changes in legal restrictions, and tasks which should be split or combined. Writing team members must be selected from instructors, incumbent workers, instructional designers, supervisors of incumbent workers, persons with expertise in test item construction, and a project staff. The writer's responsibilities include:

1. Identify and validate a task list.
2. Conduct task analysis.
3. Write test items.
4. Review and edit test items.
5. Aid in validating items (field test).

Trade instructors and workers provide subject matter expertise, describe performance steps, identify tools, equipment, work aids required to complete the task, and components of actual performance. Once task analysis is complete, the substance for test items is at hand. Task analysis reveals:

* Occupational definition.
* Performance objective.
* Major steps.
* Work attitudes and employability skills.
* Psychomotor skills, subskills, knowledge, and attitudes.
* Tools, materials, special conditions, and equipment.
* Basic academic skills.

The following steps illustrate task analysis.

1. Start with the most basic task within a task cluster (Duty).

2. List major performance steps of the task.

3. Analyze each step:

   a. Identify cognitive components:
      terminology; interpret symbols or signals; types of calculations, problem-solving, diagnoses, trouble-shooting, and planning.

   b. Identify psychomotor activities:
      what the workers do with their hands; use of senses; strenuous activity; exposure to hazardous working conditions;

   c. Identify affective components:
      safety; attitudes; employability skills.

4. List the necessary tools, equipment, special conditions, and materials necessary to perform the task.

5. List specific attitudes that support the task (what are acceptable work habits, mode of dress, or beliefs).

6. Review analysis with subject matter experts and revise.

7. Identify types of test items to be written for each task.

* Written test items should be considered for the "knowledge" components identified in the task analysis.

* Performance test items (with process and/or product checklists) should be considered for the "do" components identified in the task analysis.

* Safety and employability skills are integral parts of the task that need to be included in test items.

The following steps illustrate test item writing:

1. Determine minimum number of items to write for each task.

2. Decide upon the item format and write items.

a. Develop written (multiple choice and matching) items.

1) Write item stems based on cognitive skills, recall of information, and application of knowledge identified in the task analysis.

2) Determine common misconceptions or mistakes made by students, novices, and uninformed workers to be used as distractors.

3) Review items using agreed upon test item construction guidelines and format.

4) Edit each item often.

A word of caution when employing trade instructors as writers: test items may seem to be original, but are actually familiarities left over from frequent use of published tests. Unintentional plagiarism may be difficult to detect.

b. Develop performance (product and process) test items:

1) Use performance steps in the task analysis to provide a basis for performance checklists.
2) Identify important subskills that should be tested.
3) Identify generally accepted safety practices.
4) Ensure the behavior being tested is observable.
5) Develop checklists or rating scales. The steps may also double as the checklists.
6) Include process and product standards (criteria).
7) Write instructions for test administrators and students.
8) Write lists of materials, tools, equipment, and conditions required for performance or process to occur.
9) Place yourself in the role of a student and edit the items based on clarity.
10) Place yourself in the role of a test administrator and edit the items based on realistic approach (Can the test be realistically administered?).

3. Edit items for clarity, grammer, and spelling.

4. Employ trade instructors to review items.

5. Edit items for adherence to guidelines.

6. Field test items (pretest/posttest).

7. Rewrite poor distractors, poor stems, and unclear matching as indicated by field test.

The field test validates the items. V-TECS recommends at least 60 uninstructed students per item in the field test. Administering the same test to the same group after receiving instruction will yield the best results. However, as time and money constraints are ever increasing, the same number of incumbent workers may be used as an instructed group. Multiple choice, matching, and true/false can be machine scored, reliable, and inexpensive to field test. Performance tests are difficult to validate. Therefore, agreement among trade instructors, and close adherence to performance objectives is required.

Two measures are best used to analyze the items. The Item Difficulty Index (or Easiness Index) is a measure of an item being to easy or too difficult. The difficulty is indicative of poorly researched, analyzed, or written item.

Item Discrimination Index will reveal which group (instructed or uninstructed) scored better on the item. The uninstructed group scoring better than the instructed group shows signs of problems with content, writing, or possibly an incorrect answer on the answer key.

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